

AMENDMENTS TO THE CLAIMS

A detailed listing of all claims that are, or were, in the present application, irrespective of whether the claim(s) remains under examination in the application are presented below. The claims are presented in ascending order and each includes one status identifier. Those claims not cancelled or withdrawn but amended by the current amendment utilize the following notations for amendment: 1. deleted matter is shown by strikethrough for six or more characters and double brackets for five or less characters; and 2. added matter is shown by underlining.

1. (Currently Amended) A method of seismic exploration ~~which comprises~~ comprising:

generating a seismic event;

applying the seismic event to ~~the earth's surface~~ a body of water having a sea bottom;

detecting a response to the seismic event within a detection area of the sea bottom from a position spaced apart from the sea bottom, the ~~detected~~ response including P-waves and S-waves ~~in the earth's surface~~ resulting from the seismic event; and

analysing ~~analyzing~~ the ~~detected~~ response; and

~~in which:~~ wherein:

[[the]] detecting ~~step comprises~~ the response includes monitoring successively each of a plurality of non-discrete, overlapping segments defining the detection area and recording to ascertain the response to the seismic event in the form of movements of particles at the earth's surface, in the detection area from a position spaced from the earth's surface, the detecting step being carried out over a response period and recording a detected response to the seismic event, the response period being a predetermined period of time after the seismic event; [[and]]

[[the]] analyzing ~~step comprises analyzing~~ the response includes analyzing the movements of the particles in the detection area of the ~~at the earth's surface in the recorded response to the seismic event~~ sea bottom ascertained during the response period; and

~~wherein~~ monitoring ~~includes~~ is carried out using a monitoring apparatus which is moved relative to the ~~earth's surface~~ sea bottom during the response period.

2. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 1, ~~in which wherein~~
monitoring further includes applying successively to each of the plurality non-discrete,
overlapping segments defining the detection area ~~the movements of the particles are monitored~~
using light, in the form of visible light, x-rays, UV light or IR light, or ~~[[using]]~~ another form of
radiation including radio waves, radar, sonar or ~~[[using]]~~ acoustic waves.

3. (Cancelled)

4. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 1, ~~in which the analysing~~
~~step includes wherein analyzing further includes the elimination~~ eliminating from the detected
response of noise caused by ~~the relative~~ movement of the monitoring apparatus in relation to the
sea bottom.

5. (Cancelled)

6. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 1, ~~in which the wherein~~
using a monitoring apparatus ~~comprises~~ includes the step of using a plurality of monitoring
devices ~~which are used~~ simultaneously at different locations.

7. (Currently Amended) [[A]] ~~The method as claimed in of claim 1, in which the~~ wherein detecting the response further includes:
is transformed to transforming the response into digital form; and
recorded recording the response in digital form.
8. (Currently Amended) [[A]] ~~The method as claimed in of claim 1, in which the analyzing step comprises analysing~~ wherein analyzing further includes analyzing surface particle displacements, ~~and/or~~ velocities, and/or accelerations.
9. (Currently Amended) [[A]] ~~The method as claimed in of claim 2, in which the~~ wherein using the monitoring apparatus comprises includes directing a source of coherent mono frequency light ~~directed at the surface area being monitored,~~ the detection area and ~~a receiver for receiving~~ reflected coherent light.
10. (Currently Amended) [[A]] ~~The method as claimed in of claim 9, in which the~~ wherein monitoring further includes using the coherent light and a reference beam are used to make speckle patterns by means of interferometry, and changes in and analyzing further includes analyzing the speckle patterns ~~are analysed in the analysing step.~~
11. (Currently Amended) [[A]] ~~The method as claimed in of claim 2, in which the monitoring apparatus comprises~~ wherein using the monitoring apparatus further includes using a video recording apparatus.

12. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 11, ~~in which the~~ wherein using the video recording apparatus includes using one or more cameras operating on [[the]] a basis of visible light.

13. (Currently Amended) [[A]] ~~The method of seismic exploration, as claimed in~~ claim 1, ~~wherein and in which the earth's surface is the sea bed,~~ applying the seismic event is ~~applied~~ includes applying the seismic event ~~to the sea or~~ directly to the sea bottom ~~bed and the~~ monitoring apparatus is spaced above the sea bed.

14. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 13, ~~in which~~ wherein using the monitoring apparatus includes locating the monitoring apparatus ~~is located from~~ between approximately 0.5 to 5 ~~metres~~ meters above the ~~sea floor~~ sea bottom during the response period.

15. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 13, ~~in which~~ wherein using the monitoring apparatus includes ~~additionally comprises~~ using a hydrophone.

16. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 13, ~~in which the monitoring apparatus is either towed or is self propelled and the wherein analyzing step includes the elimination from the detected response of eliminating noise representing disturbances caused by the motion of the monitoring apparatus from the detected response, the monitoring apparatus being towed or self propelled.~~

17. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 13, ~~in which wherein monitoring successively each of the plurality of non-discrete, overlapping segments defining the detection area to ascertain the movements of the particles whose movements are detected are includes monitoring successively each of the plurality of non-discrete, overlapping segments defining the detection area to ascertain the movements of~~ sand particles on the ~~sea floor~~ sea bottom.

18. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 13, ~~wherein in which generating the seismic event comprises~~ includes generating a seismic wave having a wavelength in ~~[[the]]~~ a range of approximately 5 to 100 ~~[[m]]~~ meters and a duration of up to approximately 3~~[[s]]~~ seconds.

19. (Currently Amended) [[A]] ~~The method as claimed in~~ of claim 13, ~~wherein monitoring over a response period includes monitoring in a range of approximately in which the response period is from 4 to 8 seconds.~~

20. (Currently Amended) ~~[[A]] The method as claimed in of claim 13, in which wherein~~
monitoring using the monitoring apparatus comprises includes monitoring using a plurality of
monitoring devices mounted on a plurality of cables, the monitoring devices on each cable being
spaced from each other by a distance which is less than the wavelength of the transmitted seismic
event.

21. (Currently Amended) ~~An apparatus Apparatus~~ for carrying out seismic exploration ~~which~~
~~comprises comprising:~~

~~means for generating a seismic event generator;~~

~~means for applying a seismic delivery device adapted to apply the seismic event~~
~~to the earth's surface a body of water having a sea bottom;~~

~~a detecting apparatus for detecting adapted to detect within a detection area of the~~
~~sea bottom a response to the seismic event, the response including P-waves and S-waves~~
~~in the earth's surface resulting from the seismic event, the detecting apparatus being~~
~~spaced apart from the sea bottom; and~~

~~means for analyzing the detected response an analyzer;~~

~~and in which wherein:~~

~~the detecting apparatus comprises includes a monitoring apparatus adapted to~~
~~monitor successively each of a plurality of non-discrete, overlapping segments defining~~
~~the detection area to ascertain and recording apparatus arranged to monitor and record the~~
~~response to the seismic event in the form of movements of particles at the earth's surface~~
~~in the detection area, from a position spaced from the earth's surface, over a response~~

period and a recording apparatus adapted to record a detected response to the seismic event, the response period being a predetermined response period after the seismic event; and

wherein the monitoring apparatus is ~~[[moved]]~~ adapted to move relative to the ~~earth's surface~~ sea bottom during the response period.

22. (Currently Amended) The apparatus of ~~Apparatus as claimed in~~ claim 21, ~~in which~~ wherein the monitoring apparatus ~~[[uses]]~~ is adapted to apply to the detection area light, in the form of visible light, x-rays, UV light or IR light or ~~[[uses]]~~ another form of radiation including radio waves, radar, sonar or ~~[[uses]]~~ acoustic waves.

23. (Currently Amended) The apparatus of ~~Apparatus as claimed in~~ claim 21, ~~in which~~ wherein the monitoring apparatus is ~~movable~~ adapted to move relative to the ~~earth's surface~~ sea bottom during the response period.

24. (Currently Amended) The apparatus of ~~Apparatus as claimed in~~ claim 21, ~~in which~~ wherein the monitoring apparatus is capable of being kept stationary during the response period and then moved to a different position after the response period.

25. (Currently Amended) The apparatus of ~~Apparatus as claimed in~~ claim 21, wherein the monitoring apparatus ~~comprises~~ includes several monitoring devices which ~~[[are]]~~ can be used simultaneously at different locations.

26. (Currently Amended) The apparatus of ~~Apparatus as claimed in~~ claim 21, in ~~which~~ wherein the monitoring apparatus ~~comprises~~ includes a source of coherent light arranged to be directed at the detection area ~~being monitored~~, and a receiver for reflected coherent light.

27. (Currently Amended) The apparatus of ~~Apparatus as claimed in~~ claim 21, in ~~which~~ wherein the monitoring apparatus ~~comprises~~ includes a video recording apparatus and the ~~recorded response is~~ recording apparatus is adapted to record a visual record.

28. (Currently Amended) The apparatus of ~~Apparatus for seismic exploration, as claimed in~~ claim 21, ~~and in which: the earth's surface is the sea bed,~~ wherein the seismic delivery device is adapted to apply the seismic event ~~is arranged to be applied to the sea or directly to the sea bottom~~ sea bed and the monitoring apparatus is arranged to be spaced above the sea bed.

29. (Currently amended) The apparatus of ~~Apparatus as claimed in~~ claim 28, in ~~which~~ wherein the detecting apparatus additionally ~~comprises~~ includes a hydrophone.

30. (Currently Amended) The apparatus of ~~Apparatus as claimed in~~ claim 28, in ~~which~~ wherein the detecting apparatus is ~~either arranged~~ adapted to be towed by a vessel or is self-propelled.

31. (Currently Amended) ~~The apparatus of~~ ~~Apparatus as claimed in claim 21, in which~~ wherein the detecting apparatus ~~comprises~~ includes a plurality of monitoring devices mounted on a plurality of cables, the monitoring devices on each cable being spaced from each other by a distance which is less than the wavelength of the transmitted seismic event.

32. (Currently Amended) ~~A method of producing a seismic survey report of a region, which~~ comprises ~~The method of claim 1, wherein~~ carrying out a method as claimed in claim 1; analyzing includes deriving ~~from the analysing step;~~ representations of subsurface layers[[:]] and assembling the representatives as a depiction of [the]] a geological structure of the region.

33. (Cancelled)

34. (New) The method of claim 2, wherein monitoring successively further comprises recording successively reflected light in the form of visible light, x-rays, UV light or IR light or another form of radiation including radio waves, radar, sonar or acoustic waves from each of the plurality of non-discrete, overlapping segments defining the detection area.

35. (New) An apparatus for carrying out seismic exploration comprising:

means for generating a seismic event;

means for applying the seismic event to a body of water having a sea bottom;

a detecting apparatus adapted to detect within a detection area of the sea bottom a response to the seismic event, the response including P-waves and S-waves in the sea bottom resulting from the seismic event, the detecting apparatus being spaced apart from the sea bottom; and

means for analyzing the detected response; wherein:

the detecting apparatus includes a monitoring apparatus adapted to monitor successively each of a plurality of non-discrete, overlapping segments defining the detection area to ascertain movements of particles in the detection area over a response period and recording apparatus adapted to record a detected response to the seismic event, the response period being a predetermined response period after the seismic event; and

the monitoring apparatus is adapted to move relative to the sea bottom during the response period.